

ATTENTION

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CHERRY W4XX-1050, 1051, 1052 SERIES
ALPHANUMERIC DISPLAY SYSTEMS

PLEASE NOTE

PROPER OPERATION OF YOUR SYSTEM MAY REQUIRE THE INSTALLATION OF CERTAIN JUMPERS INTO THE CIRCUIT BOARD ASSEMBLIES BEFORE INSTALLING THIS DISPLAY SYSTEM. FOR THIS REASON, THE OPTIONS PACKAGE ASSEMBLY IS SHIPPED UNASSEMBLED TO THE MAIN DISPLAY UNIT (IF ONE OF THE OPTIONS PACKAGES WAS PURCHASED WITH THE DISPLAY). REFER TO THE INSTRUCTIONS. CAUTION: EXERCISE EXTREME CARE WHEN ASSEMBLING THE TWO CIRCUIT BOARDS SO AS NOT TO BREAK THE GLASS TUBULATION ON THE BACK OF THE DISPLAY.

3/7/80

CEPCO P.N. 0019-0001

CHERRY ELECTRICAL PRODUCTS CORPORATION
W4XX-1050 SERIES ALPHANUMERIC GAS-DISCHARGE
DISPLAY SUBSYSTEMS

Once Over Lightly

COMPLETE MICROPROCESSOR-CONTROLLED CIRCUITRY INCLUDES DRIVERS, CHARACTER GENERATOR, REFRESH MEMORY, AND PROVIDES ALL STANDARD FUNCTIONS. POWER SUPPLY, BUFFERED I/O, AND SERIAL INTERFACE FUNCTIONS ARE OFFERED AS PLUG-ON OPTIONS.

These intelligent display systems are self initializing and completely addressable with 19 ASCII control codes.

Standard features include three end-of-line modes; left entry with auto line feed carriage return, writeover carriage return, or horizontal scroll. Five levels of brightness are programmable to provide over 6 to 1 range of light output control in 4 dB steps.

A fully addressable flashing visual cursor is provided to indicate the next character position to be written. In addition to backspace, tab, and selective addressing, cursor functions include erase to end of line and erase to start of line. Flashing panel and self-test mode are also standard.

Available in 16 character (Model No. W416-1050), 20 character (Model No. W420-1050), and 24 character (Model No. W424-1050), the systems are ASCII compatible and require no initialization routines by the user. This allows the system to be easily interfaced to most equipment, regardless of whether the user's equipment is computer-controlled.

All main display assemblies may be fitted with either of two standard power-I/O option assemblies. Model W0E0-0001 option provides high voltage converter, buffered data and control lines, and serial interface with selectable baud rates. The W0E0-0002 option is similar, but does not contain the serial interface.

STANDARD FEATURES

- Full ASCII Input - Truncated ASCII display (i.e. upper or lower case alphabetic characters are displayed as upper case).
- Commas and periods are displayed in same frame as last character, providing better message packing.
- Variable Brightness - Brightness may be set with hard-wired strap and/or modified via ASCII control codes.
- Visual Cursor - The flashing cursor (3 Hertz) is composed of the period and comma together to enable reading the existing character in that frame. The cursor may also be disabled.
- Full Address Capability - Data may be entered in asynchronous sequential manner or any particular frame may be directly addressed.
- User enabled flashing display.
- Self-test mode - ASCII set is scrolled across panel.
- Selectable End-Of-Line Modes - Strappable with ASCII control over-ride.
 - Auto Carriage Return (write-over)
 - Auto Carriage Return/Line Feed
 - Horizontal Scroll
- TTL/LS Compatible

STANDARD OPTIONS

- Single supply operation (12 VDC @ 750mA).
- Full I/O buffering - TTL/LS compatible.
- Handshake for increased access speed.
- System select lines for bus communications.
- Serial data entry with selectable baud rates of 75 to 9600 and strappable word length options.
- RS-232C, TTL, or 20mA loop interface.

ADDRESS AND CONTROL INFORMATION

Display and cursor control can be performed via the data lines by entering the codes shown.

<u>ASCII CODE</u>	<u>HEX CODE</u>	<u>FUNCTION DESCRIPTION</u>
NUL	0 00	Self-Test: Full ASCII set is scrolled across panel.
Control A	1 01	EOL - auto CR: Data enters from left to right. Cursor returns to left end to write over existing characters.
Control B	2 02	EOL - auto CR/LF: Same as above except display is cleared before writing 1st character at left end.
Control C	3 03	EOL - Horizontal Scroll: When right-most character of display is filled, next character entered causes existing message to shift to the left one frame, writing last character in right-most position.
Control H	8 08	Back Space: Decrement Cursor.
Control I	9 09	Horizontal Tab: Increment Cursor.
Control J	10 0A	Line Feed: Clear display - does not affect cursor.
Control M	13 0D	Carriage Return: Cursor to left-most position - does not affect display.
Control N	14 0E	Erase to end of line: All characters from and including cursor to right end of display are cleared.
Control O	15 0F	Erase to start of line: All characters from and including the cursor are cleared to the left end of display.
Control P	16 10	Blank Display: Low power mode - all registers preserved (Display Off). Also cancels flash mode.
Control Q	17 11	Cursor Off: Visual cursor not displayed but still controlling RAM.
Control R	18 12	Display Recall: Display returned from blanked condition. (Display On).
Control S	19 13	Cursor On: Flashing visual cursor. If display is in flash mode, turning on the visual cursor will defeat the display flash mode.
Control T	20 14	Flash Display. Display flashes on/off at 3 Hz. Flashing Cursor is disabled during flash mode.

<u>ASCII CODE</u>	<u>HEX CODE</u>	<u>FUNCTION DESCRIPTION</u>
Control X	24 18	Reset: Reinitialize display - cancel all software modified strap options and clear display. (Cold start.)
Control Z	26 1A,n	Brightness: Two Byte instruction used to modify display light output. Format is: 1A, 0000XXXX (HEX) or Control Z, n (ASCII) where XXXX is a hex number between 1 and 5, or, where n is an ASCII number between 1 and 5, where 5 represents a maximum brightness and each number below 5 causes a 4 dB reduction in light output.
Escape	27 1B,m	Random Cursor Address: Two Byte instruction used to modify cursor position on selective basis. Format is: 1B, 011XXXXX (HEX) or ESC, m (ASCII) where XXXXX is a hex number between 01 and 10 for 16 character displays, 01 and 14 for 20 character displays, and 01 and 18 for 24 character displays. Also, m is an ASCII Alpha Character between A and P for 16 character displays, A and T for 20 character displays, and A and X for 24 character displays.
Delete	127 7F	Delete: Backspace cursor and remove previous character (write space).

INITIALIZATION STRAP OPTIONS

Main Display Assembly

The main display assembly consists of the glass display panel, mounting bracket, and printed wiring board containing the microcomputer and associated drive electronics.

Three (3) jumper positions, W1, W2, W3, are available on this board for initializing the display brightness level and the character entry end-of-line (EOL) mode. Refer to Figure 1 for location of jumpers W1, W2, and W3.

Brightness Level Strap

The display system brightness level can be programmed to power-up at level 2 (about 20 foot-Lamberts) for low ambient light conditions by installing jumper W1. Otherwise, the system will default to level 4 (50 ft-L) upon power-up if jumper position W1 is allowed to remain open.

Character Entry EOL Mode Strap

The character entry end-of-line mode is programmed with jumper W2 or W3. The installation of jumper W2 will initialize the system in the horizontal scroll mode. The auto carriage-return and line-feed mode is selected by inserting jumper W3. If no jumper is installed at either location W2 or W3, the display system will default to the write-over carriage return mode upon power-up. Operation with both W2 and W3 jumpers installed simultaneously is undefined and is not recommended.

Regardless of which jumpers are installed, both the brightness level and the character entry EOL mode are capable of being changed, if so desired, by inputting the appropriate ASCII control codes after the system is powered-up. See the Address and Control Information section for details.

A brief summary of the Strap options just described is given in Table I.

WOEO-0001 Power/Communications Assembly

This circuit board assembly contains the serial communications electronics, input/output buffers, and the high- and low- voltage converters. Thirteen (13) jumper positions are available on this assembly for configuring the serial parameters. To locate these jumper positions, refer to Figure 2. No jumpers are required to be installed on this assembly if parallel input only is desired.

Unlike the brightness level and the end-of-line mode, the strap options programmed for the baud rate, word length, and serial input mode are not alterable by means of any control codes.

Serial Word Length Options

Serial communications in the W400-1051 series display systems utilizes the 6850 asynchronous communications interface adapter for converting the incoming serial data to the required parallel format. Use of the 6850 allows some flexibility as to the number of data bits, stop bits, and parity selection. It is necessary therefore, to insert the appropriate jumpers, WA, WB, WC, to program the required serial word options. This information is provided in Table II.

Baud Rate Selection

Nine baud rates are available for serial communication. The desired baud rate is selected by inserting the appropriate jumper into the circuit board assembly, at jumper locations W1 through W9. Jumper designations for corresponding baud rates are given in Table III.

RS-232C Communications

Serial communications by means of constraints imposed by EIA specification RS-232C (and also certain TTL and MOS/CMOS interface) is possible by connecting the serial transmission line to the RS-232C input which is available at Pin 1 of the data connector, P2. Circuit return is through connection to the signal common (GND) connection at Pin 2 of P2.

The display system is shipped with the RS-232C input already enabled. Therefore, other than inserting the appropriate baud rate jumper (W1-W9) and the necessary word-length jumper(s) (WA-WC), no other jumper placement is necessary.

In the interest of flexibility, however, positions have been provided in the circuit board for the purpose of signal conditioning components, C1 and R1, should the need arise. High frequency response may be limited by the introduction of C1, while the DC operating point may be altered by certain values of resistance at R1. Operating conditions for a given range of C1 and R1 are provided in Figures 3 and 4 respectively. Figure 5 shows several interface schemes.

TTY (20mA Loop) Input

The 20 mA current loop input is available at Pin 3 of the data connector, P2. If an active 20 mA line (supply source) is supplied by the user's terminal, then the loop return is taken from the signal ground connection at Pin 2 of data connector P2.

If the user's terminal provides only contact closures, the necessary 20 mA loop current may be derived from the display system by connecting the loop contacts between Pins 3 (-) and 4 (+) of data connector, P2; this provides for 12-volt open-circuit voltage at the contacts. A 5-volt open-circuit voltage is possible by connecting the contacts to pins 3 (-) and 6(+). In either case, the necessary current limiting is provided by the display system.

These connection schemes are depicted in Figure 6.

TTY Enable

When communicating with the display by means of the 20 mA current loop, it is necessary to enable the loop input by installing jumper W10. (See Figure 2.) Inserting this jumper simultaneously disables the RS-232C input.

WOEO-0002 Power-I/O Assembly

This assembly is identical to the WOEO-0001, described above, except that all serial interface has been eliminated. Therefore, no jumpers need be installed on the WOEO-0002 option assembly.

ASSEMBLING THE DISPLAY SYSTEM

When the necessary and/or desired jumpers have been installed in BOTH circuit boards, the power/communications package may be assembled to the main display assembly.

Packaged with the options assembly is a bag containing two (2) plastic spacers and two (2) 6-32 x 5/16 screws.

Install the two spacers into the main display assembly circuit board by inserting the short, blunt end into the holes provided just ahead of the .045"x.045" pin header connectors, P1 and P2. Refer to Figure 1.

CAUTION

CAUTION

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IN THE NEXT STEP, THE OPTIONS PACKAGE WILL BE ASSEMBLED TO THE MAIN DISPLAY ASSEMBLY. EXERCISE EXTREME CARE TO INSURE THAT THE GLASS TUBULATION IN THE CENTER OF THE BACK SIDE OF THE DISPLAY IS NOT CRACKED OR BROKEN.

Place the main display assembly on a table or work surface, orienting it in the normal viewing position. At this time, remove the conductive shorting bar or material from the data connector, P2.

Position the power/communications option assembly over the main display assembly with the DC/DC converter (large rectangular box) on the LEFT and components up.

Carefully slip the option assembly UNDER the glass tubulation allowing the circuit board to rest on TOP of the two (2) mounting ears projecting from the metal mounting bracket. Refer to Figure 7. Guide the far end of the option board down over the long nose of the plastic spacers allowing them to protrude up through the two holes provided.

Guide the pins of the power connector P1 and the data connector, P2, up through the circuit board until they engage the female connectors. Apply moderate pressure to the TOP OF THE CONNECTORS - not the circuit board - to fully seat the connectors. The plastic spacers have a shoulder which will provide a

positive stop. Once the connectors are properly mated, the catch on the plastic spacers will lock the circuit board down. Now install the two 6-32 screws to secure the top circuit board to the mounting bracket. This completes the assembly and the unit is now ready for installation into the user's equipment.

WARNING

IT SHOULD BE NOTED THAT THE NEON GAS DISPLAY REQUIRES 180 VOLTS DC TO OPERATE, AND THAT THIS POTENTIAL IS PRESENT AT MANY LOCATIONS ON THE MAIN DISPLAY BOARD AND AT THE 6-PIN POWER CONNECTOR. ALTHOUGH THE SHOCK HAZARD FROM THE WOE0-000x HIGH VOLTAGE SUPPLY IS NOT LETHAL, CAUTION SHOULD BE EXERCISED TO PREVENT CONTACT.

Under no circumstances should this display system be operated with the main display assembly circuit board in contact with a conductive surface. Place the system on a non-conductive surface or mount the display assembly by the bracket. The mounting bracket is connected to circuit GND.

NOTE: W4XX-1050 is the basic display system.

WOE0-0001 is the serial/parallel option assembly.

WOE0-0002 is the parallel only option assembly.

W4XX-1050 + WOE0-0001 = W4XX-1051 System.

W4XX-1050 + WOE0-0002 = W4XX-1052 System.

Operating the W400-1051 Display System (W4XX-1050 + WOE0-0001)

Refer to Figure 2 to locate the Power Input Connector P1, and the Data Connector P2. Note that the main display assembly connectors, also P1 and P2, are mated with the interconnection sockets J1 and J2 respectively on the WOE0-0001 option assembly, and that the user makes no further connections there. All user connections are made to the WOE0-0001 (upper) circuit board assembly connectors, P1, P2.

Power Input Connector, J1

Power is supplied to the system by means of the three (3) pin right angle friction lock male connector with .045" square posts. Refer to Figure 10 for pin identification.

Required power is 12.0 volts DC, -2.5%, +5.0%; (11.7 to 12.6 volts). Maximum average system current is 0.75 amperes. This power requirement is readily obtainable from the 7812 series regulators.

Data (Communications) Connector, J2

Input data and system control is accessed to the display by means of the 26-pin right angle double readout male connector with .025" square pins on .100" centers. Refer to Figure 10 for pin identification.

Up to 50 ma current (5.0 volts) is available at pin 6 of P2 for any peripheral logic that may be required by the user. Circuit Return (GND) should be taken from pin 26 of P2.

System Enable

The display system is disabled as long as the ENABLE line (pin 7, P2) remains high (open). Drawing pin 7 low enables the display system, and permits addressing a multiplicity of display systems on a common data bus.

Parallel/Serial Select

Pin 5, P2 permits selection of parallel or serial mode, thus allowing a combination of both serial AND parallel operation with the same system. Parallel mode is enabled when pin 5 is allowed to remain high (open). During parallel operation the serial converter is disabled. Drawing the P/S select line low

enables the serial mode and "floats" the parallel data bus and strobe inputs. The significance of this feature is that parallel and serial data may be input to the display system simultaneously, the proper mode being selected by pin 5.

Hand Shake (Valid Data taken Pulse)

Pin 8, P2 is an output line which signals the reading of the data bus by the microcomputer. When the CPU is interrupted, either by the data strobe while in the parallel mode, or a receive register full flag from the serial converter, the input data is read and saved in memory. If the data is not HEX 7F, the data is treated as valid parallel mode data and a dummy data read is executed on the serial converter, causing the "Valid Data" line, pin 8, P2, to go low for about 10 microseconds.

If the data has, in fact, a value of HEX 7F, the status register of the serial converter is read. If the status word is 7F, (serial mode disabled) the CPU concludes that the system is in the parallel mode, and that the data is actually 7F (DELETE control code), and a dummy read is executed on the 6850 to output the "Valid Data" pulse (10 μ sec.).

If, upon reading the 6850 Status register, the interrupt was caused by the 6850 (Serial Mode), the status word is examined for transmission errors (parity, frame, overrun). If no errors are present, the CPU reads the valid data from the 6850 data register, which causes a data taken pulse to be output. If a transmission error is flagged, the CPU resets the 6850, writes an asterisk (*) at the cursor location on the display, and does not output the "Valid Data" pulse.

By monitoring the valid data line, a form of handshake is established with this simplex serial system when the display is located remotely from the terminal. Upon a non-receipt of the valid data signal, a DELETE function would be written to the display to clear the (*), and then the desired character transmitted again.

Drawings

- Figures 8 and 9 are respective schematics of the W420-1050 main display assembly and the W0E0-0001 option package. These drawings are supplied to aid the user in his particular application.

Operating the W400-1052 Display System (W4XX-1050 + WOE0-0002)

Refer to Figure 2 to locate the Power Input Connector P1, and the Data Connector P2. Note that the main display assembly connectors, also P1 and P2, are mated with the interconnection sockets J1 and J2 respectively on the WOE0-0002 option assembly, and that the user makes no further connections there. All user connections are made to the WOE0-0002 (upper) circuit board assembly connectors, P1, P2.

Power Input Connector, J1

Power is supplied to the system by means of the three (3) pin right angle friction lock male connector with .045" square posts. Refer to Figure 10 for pin identification.

Required power is 12.0 volts DC, -2.5%, +5.0%; (11.7 to 12.6 volts). Maximum average system current is 0.75 amperes. This power requirement is readily obtainable from the 7812 series regulators.

Data (Communications) Connector, J2

Input data and system control is accessed to the display by means of the 26-pin right angle double readout male connector with .025" square pins on .100" centers. Refer to Figure 12 for pin identification.

Up to 50 ma current (5.0 volts) is available at pin 6 of P2 for any peripheral logic that may be required by the user. Circuit Return (GND) should be taken from pin 26 of P2.

System Enable

There are two system enable lines available on the WOE0-0002 assembly to permit bus communication. The display system is disabled as long as the $\overline{\text{EN}}$ line (pin 7, P2) remains high (open), or if the EN line (pin 5, P2) is drawn low. Drawing pin 7 low and allowing pin 5 to remain high (open) enables the display system.

Handshake (Read Data Pulse)

Pin 8, P2 is an output line which signals the reading of the data bus by the microcomputer. When the CPU is interrupted by the data strobe, the input data is read and saved in memory, causing the "Read Data" line, pin 8, P2, to go

low for about 10 microseconds.

Drawings

Figures 8 and 11 are respective schematics of the W420-1050 main display assembly and the W0E0-0002 option package. These drawings are supplied to aid the user in his particular application.

W400-1051 SERIESTABLE I

BRIGHTNESS LEVEL & EOL MODE PROGRAMMING

W3	W2	W1	CONDITION
X	X	0	High Brightness
X	X	1	Low Brightness
0	0	X	Write-Over Carriage Return
0	1	X	Horizontal Scroll
1	0	X	Carriage Return/Line Feed
1	1	X	Undefined - Don't Do It!

1 = Jumper In
 0 = Jumper Out
 X = Don't Care

TABLE II

SERIAL WORD OPTIONS

WC	WB	WA	DATA BITS	PARITY	STOP BITS
1	1	1	7	EVEN	2
1	1	0	7	ODD	2
1	0	1	7	EVEN	1
1	0	0	7	ODD	1
0	1	1	8	NONE	2
0	1	0	8	NONE	1
0	0	1	8	EVEN	1
0	0	0	8	ODD	1

TABLE III

BAUD RATE SELECTION

JUMPER	BAUD RATE	JUMPER	BAUD RATE
W1	75	W6	1200
W2	110	W7	2400
W3	150	W8	4800
W4	300	W9	9600
W5	600		

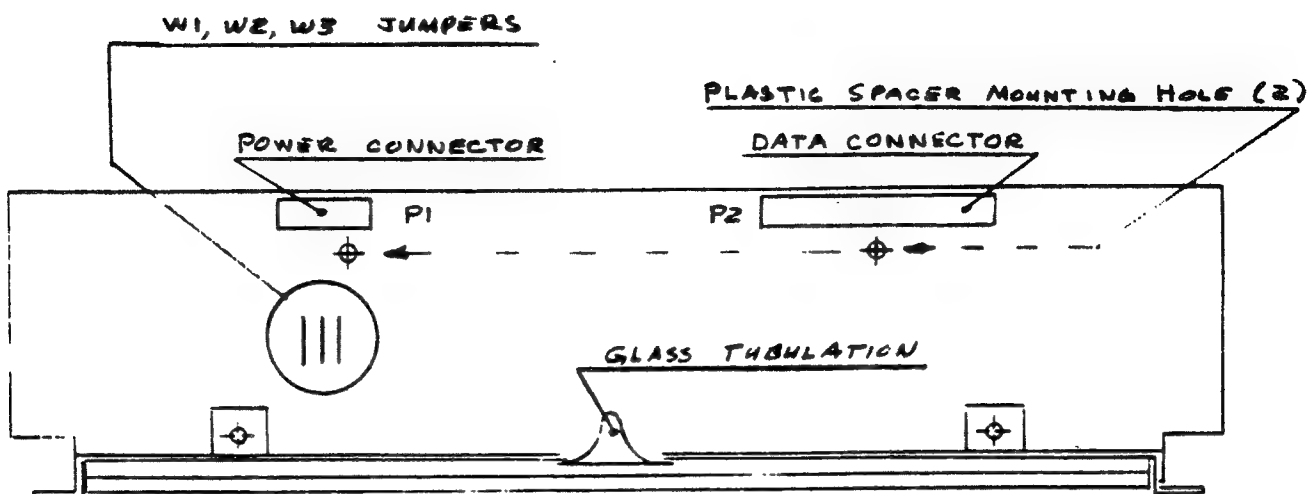


FIGURE 1 MAIN DISPLAY ASSEMBLY (TOP VIEW)

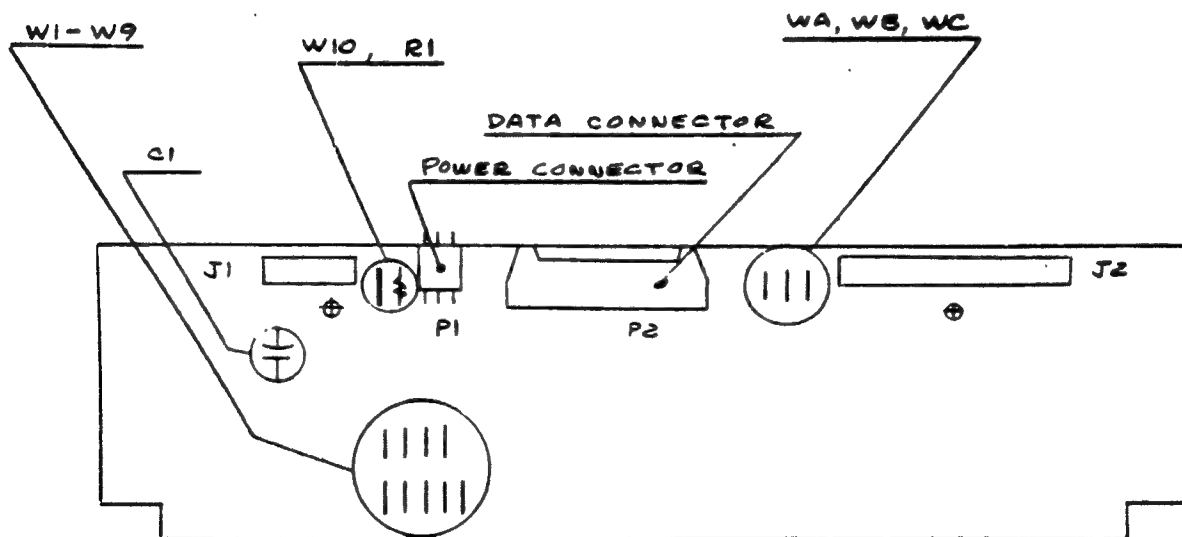


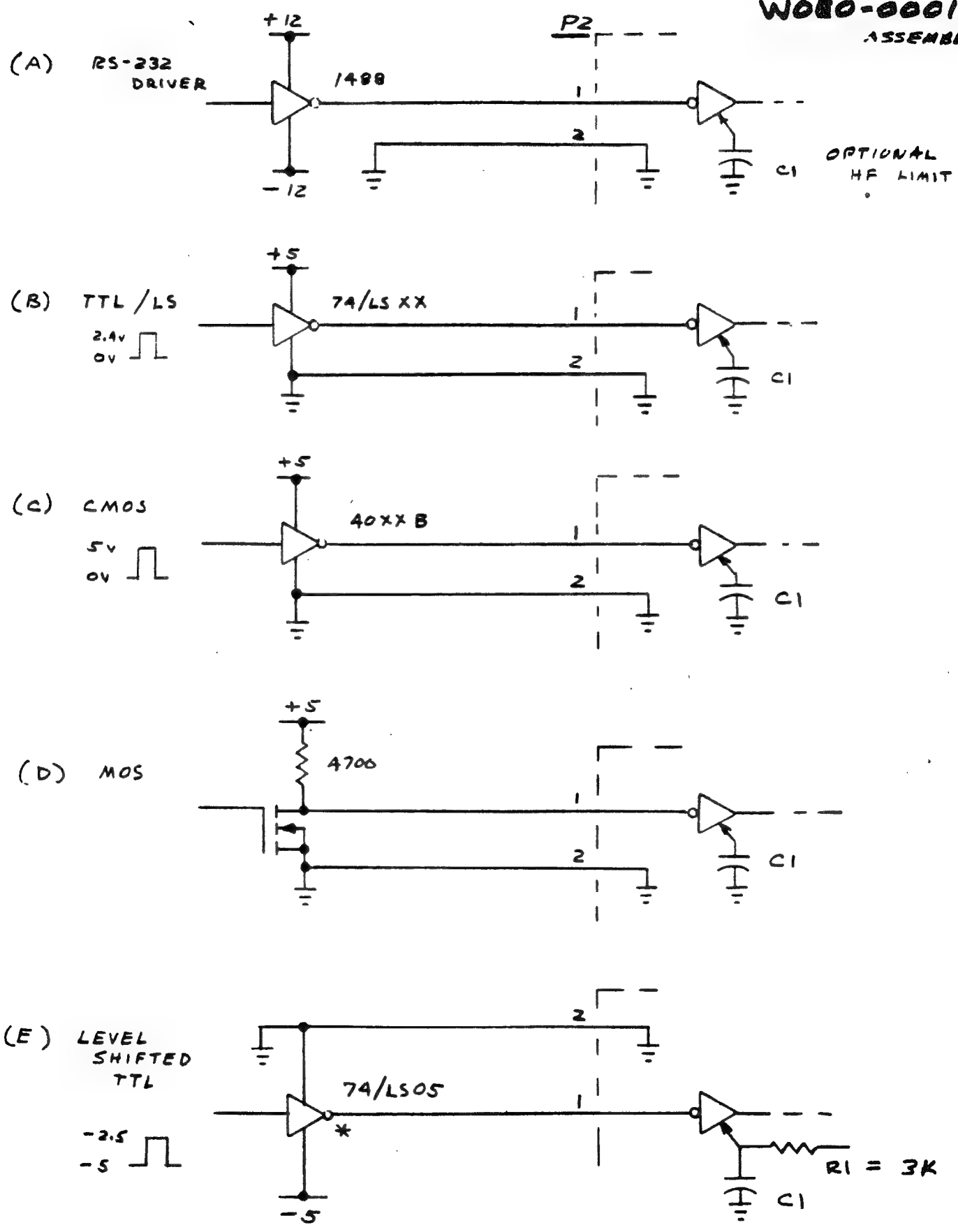
FIGURE 2 POWER/COMMUNICATIONS ASSEMBLY (TOP VIEW)

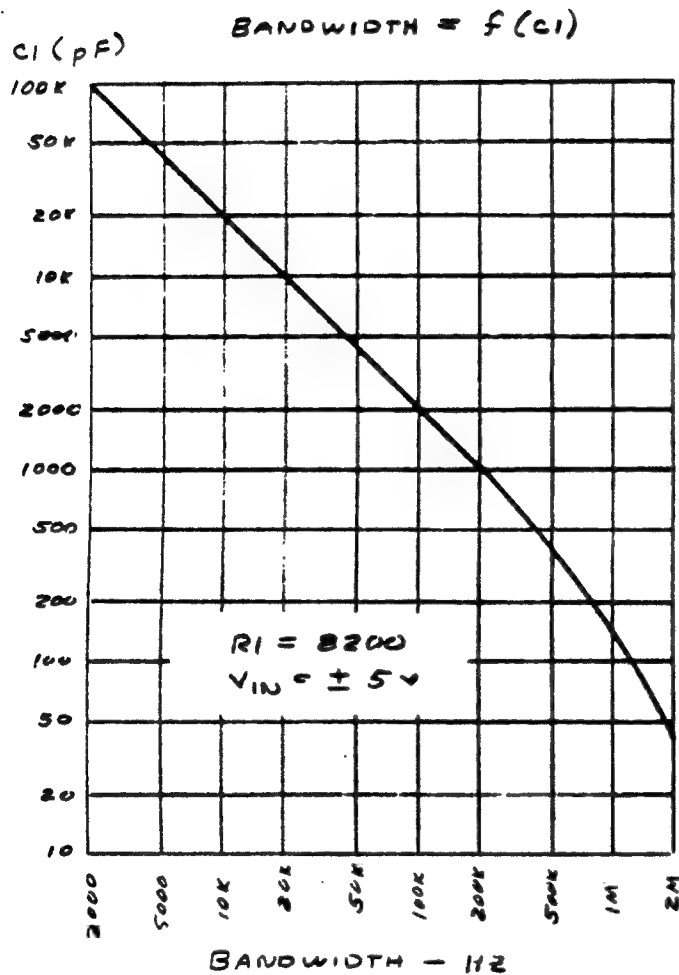
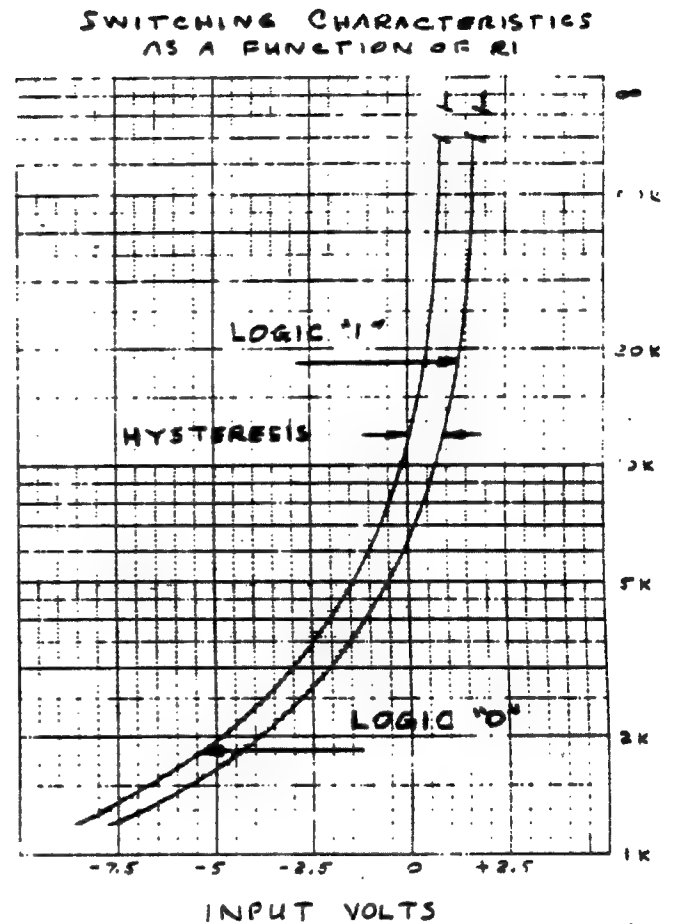
WOEO-0001 SHOWN

DISREGARD JUMPERS, C1, R1 FOR WOEO-0002

FIGURE 5 SERIAL INTERFACE CONNECTIONS

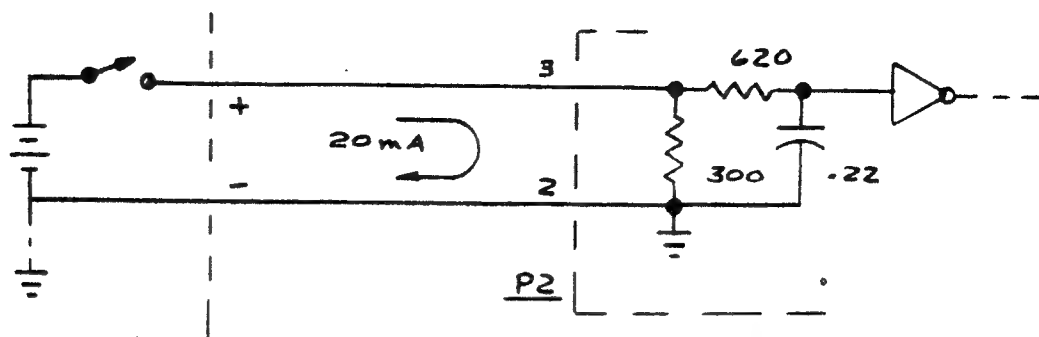
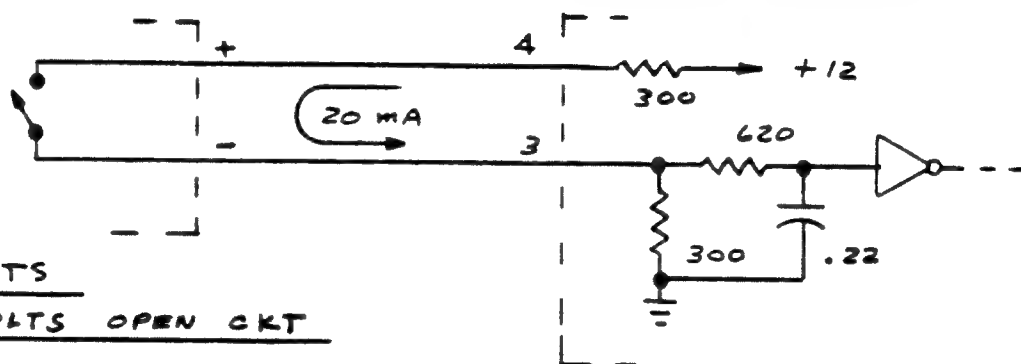
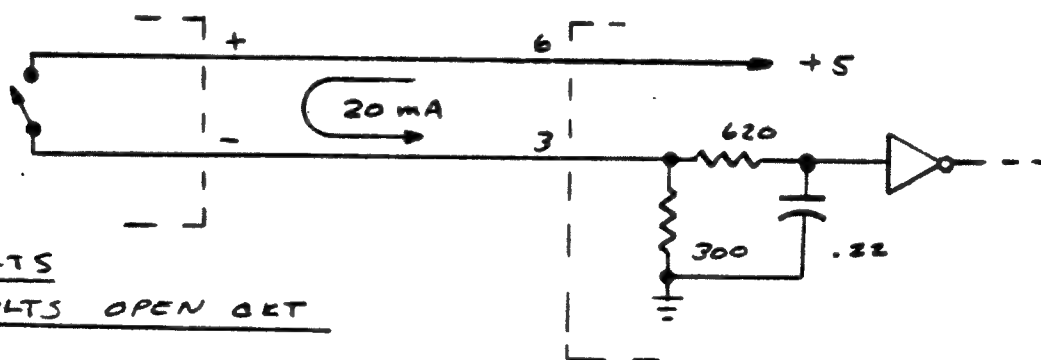
W080-0001
ASSEMBLY



W4XX - 1051 SERIESFIGURE 3FIGURE 4

SIGNAL CONDITIONING OF RS-232C
INPUT AMPLIFIER WITH C_I , R_I

(W060 - 0001 ONLY)

W4XX - 1051 SERIESFIGURE 6 20 mA CURRENT LOOP(A) ACTIVE SOURCEW080-0001
ASSEMBLY(B) CONTACTS
12-VOLTS OPEN CKT(C) CONTACTS
5-VOLTS OPEN CKT

NOTES: (ALL CASES)

- 1) INSTALL JUMPER W10 TO ENABLE 20 mA LOOP INPUT (SEE FIG. 2)
- 2) DEBOUNCE CIRCUITRY SHOWN IS CONTAINED WITHIN THE DISPLAY SYSTEM & LIMITS THE 20 mA LOOP DATA RATE TO ABOUT 2400 BAUD.

W4XX - 1051, 1052 SERIES

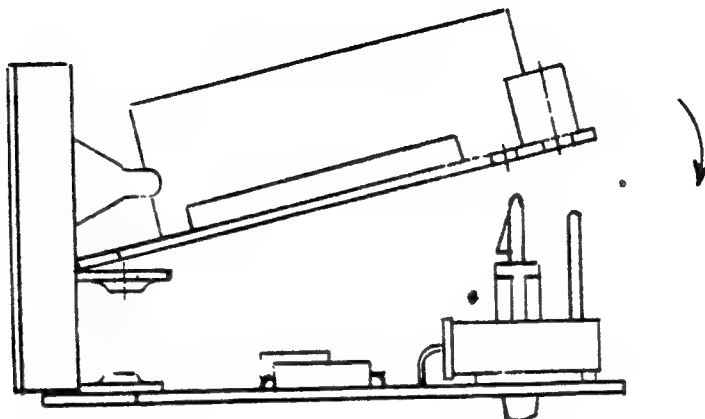


FIGURE 7

ASSEMBLE WOEO- $\phi\phi\phi$ X OPTION
PACKAGE TO MAIN ASSEMBLY

CAUTION:

EXERCISE EXTREME CARE
SO AS NOT TO BREAK
GLASS TUBULATION.

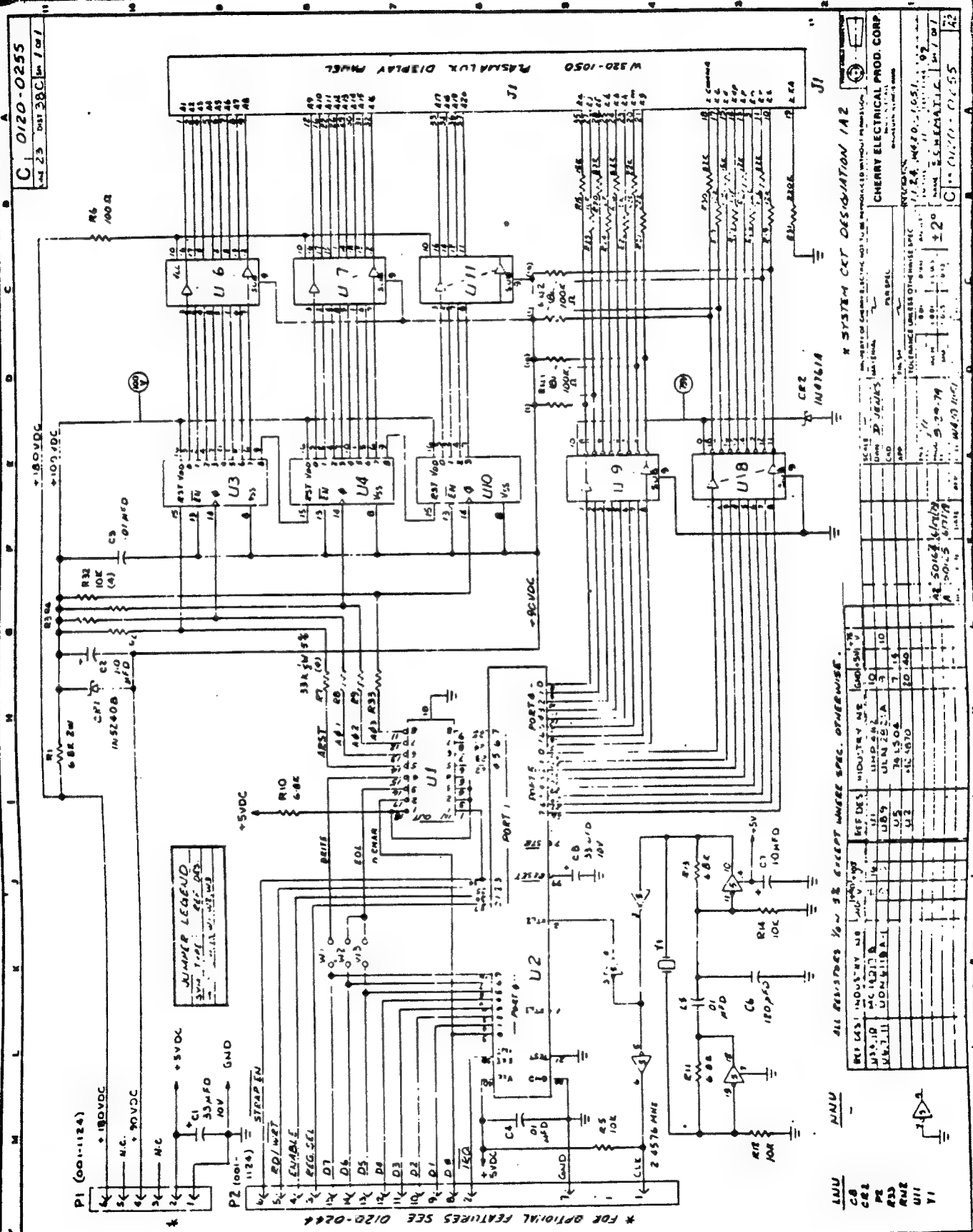
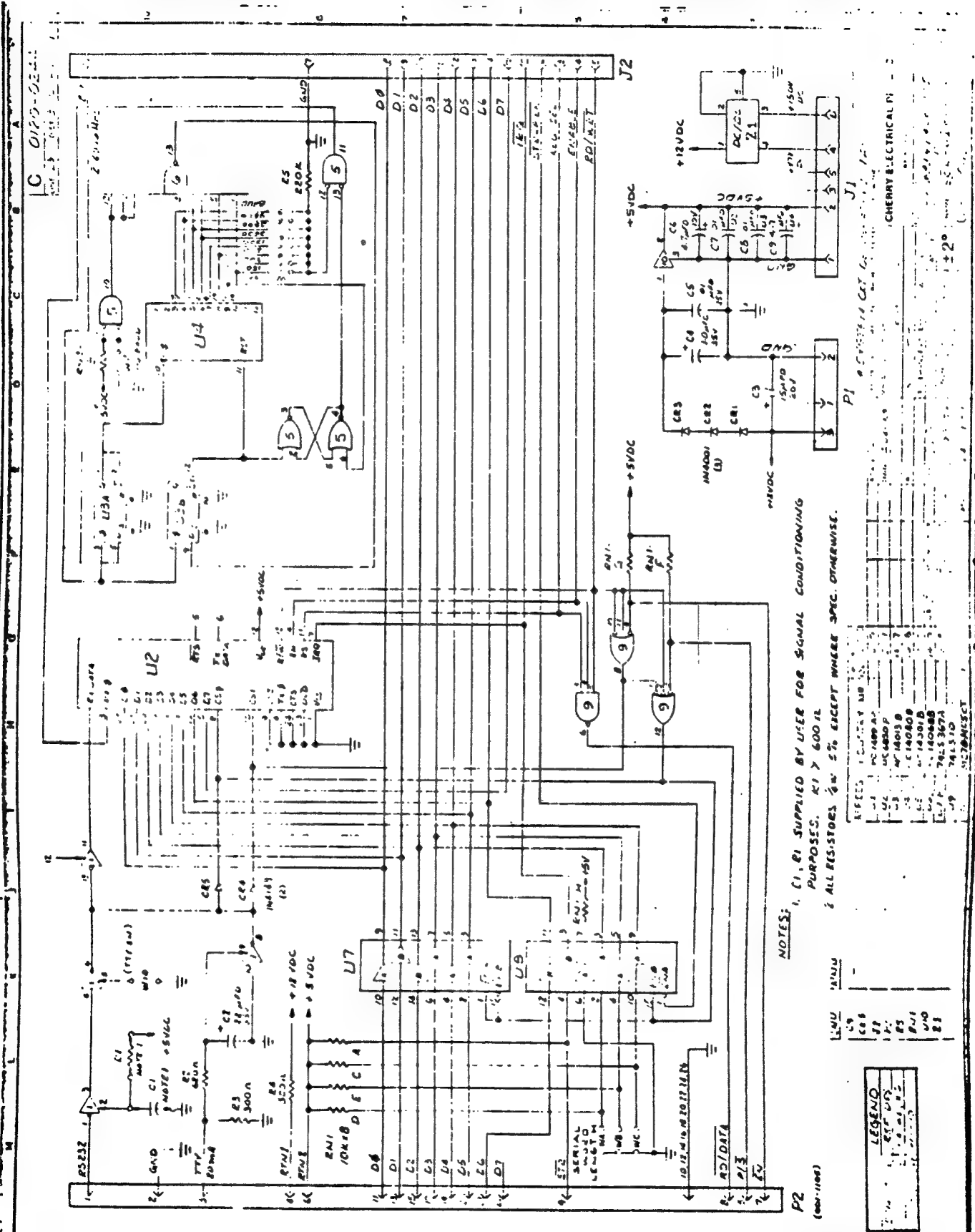


FIGURE 9 W050-0001 OPTION PKG.



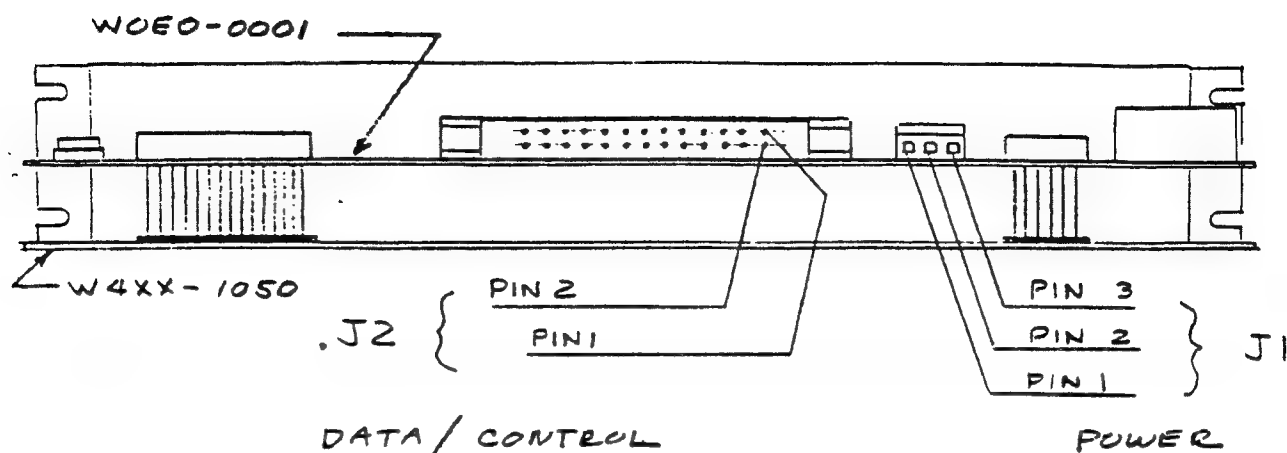
NOTES:
 1. C1, R1 SUPPLIED BY USER FOR SIGNAL CONDITIONING PURPOSES. R1 > 600Ω
 2. ALL RESISTORS 5% EXCEPT WHERE SPEC. OTHERWISE.

LEGEND

U1	74LS00
U2	74LS00
U3	74LS00
U4	74LS00
U5	74LS00
U6	74LS00
U7	74LS00
U8	74LS00
U9	74LS00
U10	74LS00
U11	74LS00
U12	74LS00
U13	74LS00
U14	74LS00
U15	74LS00
U16	74LS00
U17	74LS00
U18	74LS00
U19	74LS00
U20	74LS00
U21	74LS00
U22	74LS00
U23	74LS00
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U25	74LS00
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U87	74LS00
U88	74LS00
U89	74LS00
U90	74LS00
U91	74LS00
U92	74LS00
U93	74LS00
U94	74LS00
U95	74LS00
U96	74LS00
U97	74LS00
U98	74LS00
U99	74LS00
U100	74LS00

FIGURE 10 W4XX-1051 SERIES

CONNECTOR IDENTIFICATION



<u>J1</u>	PIN 1	NO CONNECTION
	2	GROUND (-)
	3	+12.0 VOLTS DC

<u>J2</u>	PIN 1	RS-232C INPUT
	2	SIGNAL GROUND
	3	TTY (20MA LOOP) + INPUT
	4	20 MA CURRENT SOURCE (+12V)
	5	PARALLEL / SERIAL SELECT (INPUT)
	6	+5 VOLTS DC OUT (50 MA MAX)
	7	SYSTEM ENABLE (INPUT)
	8	VALID DATA TAKEN (OUTPUT)
	9	DATA STROBE (INPUT)
	10, 12, 14, 16, 18, 20, 22, 24, 26	GROUND
	11	D0 (LSB)
	13	D1
	15	D2
	17	D3
	19	D4
	21	D5
	23	D6
	25	D7 (MSB)

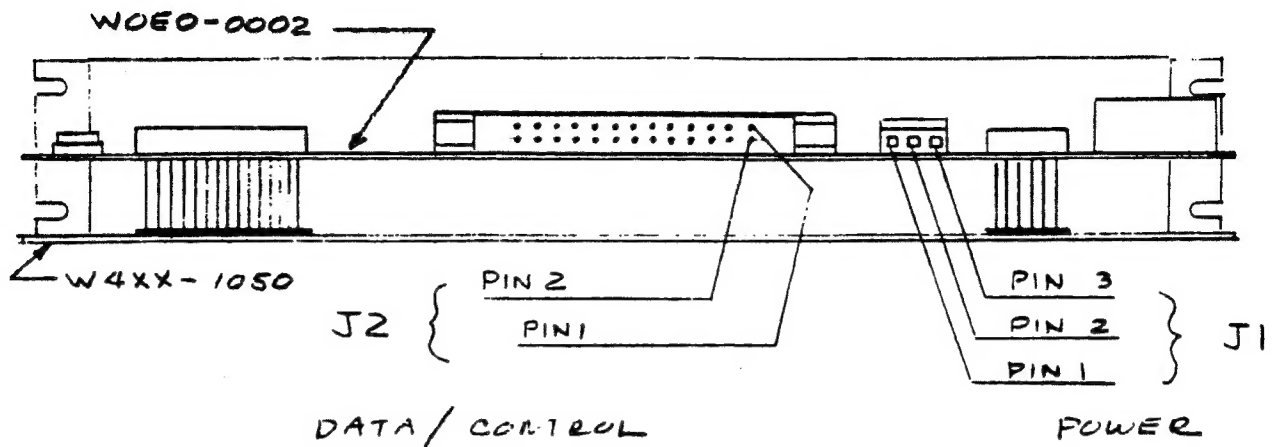
PARALLEL DATA INPUT BUS



FIGURE 12

W4XX-1052 SERIES

CONNECTOR IDENTIFICATION



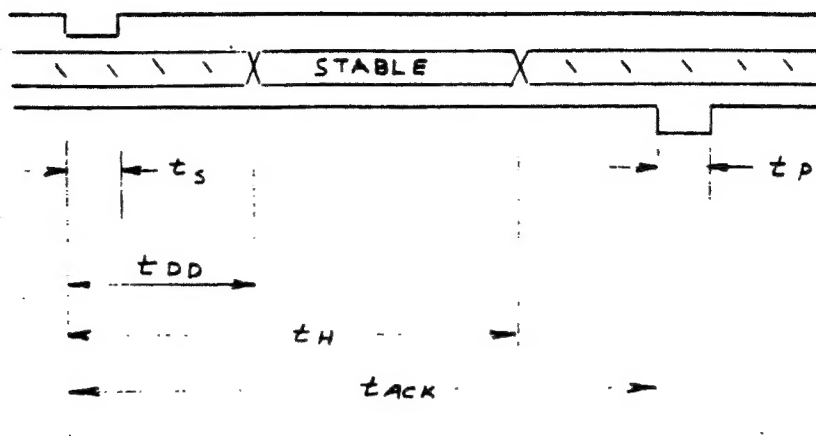
<u>J1</u>	PIN	1	NO CONNECTION
		2	GROUND (-)
		3	+12.0 VOLTS DC

<u>J2</u>	PIN	5	SYSTEM ENABLE (INPUT)
		6	+5 VOLTS DC OUT (50 mA MAX)
		7	SYSTEM ENABLE (INPUT)
		8	VALID DATA TAKEN (OUTPUT)
		9	DATA STROBE (INPUT)
		10, 12, 14, 16, 18, 20, 22, 24, 26	GROUND
		11	D0 (LSB)
		13	D1
		15	D2
		17	D3
		19	D4
		21	D5
		23	D6
		25	D7 (MSB)

PARALLEL DATA
INPUT BUS

PLASMALUX DISPLAY SYSTEM TIMINGPARALLEL OPERATION

DATA STROBE
PARALLEL DATA
RD/DATA PULSE

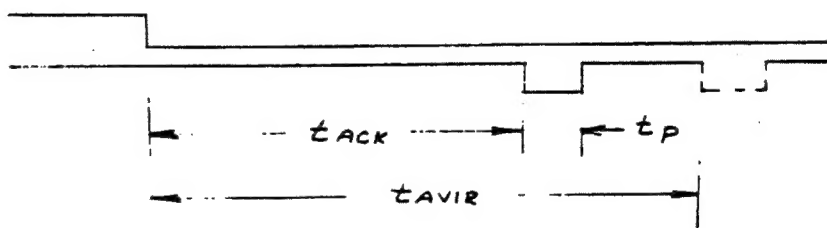


t_s	STROBE LOW LEVEL	7.0 μ sec min.
t_{DD}	PERMISSIBLE DATA DELAY	50.0 μ sec max.
t_H	DATA HOLD TIME	300.0 μ sec min.
t_p	RD/DATA (ACKNOWLEDGE)	10.0 μ sec typ.
t_{ACK}	DATA READ ACKNOWLEDGE	180.0 μ sec min. 425.0 μ sec max.

ABOVE TIMES ASSUME THAT THE DISPLAY PROCESSOR IS NOT BUSY EXECUTING ANOTHER NON-INTERRUPTABLE CONTROL CODE.

SERIAL OPERATION

INTERRUPT REQUEST
RD/DATA PULSE



t_p		20.0 μ sec typ.
t_{ACK}	READ DATA ACKNOWLEDGE	300.0 μ sec min. 3000.0 μ sec max.*

*Assumes previous command is executing

t_{AVIR} VIRTUAL ACK. - RD/DATA PULSE IS NOT OUTPUT WHEN XMISSION ERRORS (PARITY, FRAMING, OVERRUN) ARE ENCOUNTERED. PULSE WOULD OCCUR BEFORE 3000 μ sec. FOR VALID DATA.

PLASMALUX DISPLAY SYSTEM TIMING

DESCRIPTION	HEX CODE	PARALLEL		SERIAL		
		MIN	MAX	MIN	MAX	UNITS
All ASCII characters and control codes not listed below	-	530.	1030.	685.	1185	μs
1st character only when EOL mode is CR/LF	-	1485.	1630.	1640.	1785	μs
Right entry (Scroll mode)	-	1570.	1715.	1725.	1870.	μs
W416	-	1855.	2000.	2010.	2155.	μs
W420	-	2165.	2310.	2320.	2465.	μs
Line Feed	0A					
Erase To End of Line	0E	1350.	1495.	1500.	1650.	μs
Erase To Start of Line	0F					
Reset	18	2010.	2155.	2160.	2305.	μs
Clear Self Test Mode (Strobe Only)	-	1705.	1850.	1705.	1850.	μs
Power-On Clear		100ms typ, 300ms max.				

MAX POSSIBLE CONTINUOUS PAGE BAUD RATE = 2400